TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, December, 1929*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Point Barrow [1] [2]	30.00		30.62	19th	29.20	28th.
Dutch Harbor [1]	29.75	+0.17	30.36	5th	28.76	27th.
St. Paul [1]	29.75	+0.14	30.44	5th	29.04	24th.[3]
Kodiak [1]	29.75	+0.17	30.42	6th	28.82	28th.
Midway Island [1] [4]	30.11	+0.07	30.34	1st [3]	29.88	5th.
Honolulu [5]	29.94	−0.08	30.07	6th	29.74	15th.
Juneau [5]	29.89	+0.10	30.35	17th	29.06	26th.
Tatoosh Island [5] [6]	29.97	0.00	30.44	27th	29.29	10th.
San Francisco [5] [6]	30.12	+0.01	30.34	21st	29.84	11th.
San Diego [5] [6]	30.04	0.00	30.29	21st	29.76	19th.

[1] P. m. observations only.
[2] For 28 days.
[3] And on other dates.
[4] For 30 days.
[5] A. m. and p. m. observations.
[6] Corrected to 24-hour mean.

December as a whole was a somewhat stormier month than November over most of the upper half of the ocean, although the number of the more violent gales was less. High winds this month were more widespread as to area and days of occurrence and were reported from some locality or other on every day except the 12th. The greatest number of days with gales reported from any 5° square was 8, occurring east of Japan. Data at hand show that steamships encountered full storm to hurricane velocities on four days; on the 4th, in the lower part of the Bering Sea and also a few hundred miles northwest of Midway Island; on the 20th, south of the western Aleutians; and on the 21st and 25th, east of northern Japan. In November there were seven days with wind forces of 11 to 12 on the ocean, latest reports for the month showing that violent gales, not mentioned in the previous review of North Pacific weather, occurred east and northeast of Japan on the 23d, 24th, and 27th.

During the current month wind forces of 8 to 10 were common along the whole length of the northern and much of the middle routes. From the 2d to the 6th a cyclone that prevailed between the Hawaiian Islands and California occasioned much rough weather, with fresh to whole gales, and anticyclonic gales occurred in the same region on the 30th and 31st. On the 13th, 14th, 22d, 24th, and 25th gales were encountered along the Washington, Oregon, and northern California coasts. The maximum wind velocity at Tatoosh Island was at the rate of 57 miles an hour—force 10—from the east on the 13th.

To the westward of the coast region as far as the one hundred and eightieth meridian, north of the parallel of 40°, while frequent gales blew early in the month, the greatest number occurred in the last decade during the days when the Aleutian cyclone was most active. West of the central meridian the frequent gales were due largely to the presence of a fairly permanent cyclonic area—the westernmost extension of the Aleutian Low—south of Kamchatka, and to the activity of a number of cyclones which entered the ocean from Asia. Off the coast of China gales, usually of moderate force but sometimes becoming fresh, were of the northeast monsoon type. These were apparently of greatest severity on the 3d and 4th, when a powerful anticyclone pushed upon the China and Eastern Seas.

The Gulf of Tehuantepec was the scene this month of frequent strong northers. Gales were reported by seamen as occurring here on at least 12 days, on four of which, the 3d, 19th, 22d, and 23d, they attained to whole gale force. Several of these blew over a wide area of sea to the southward, but ceased rather abruptly to the westward of the gulf, as witness the instance of the British motorship *Loch Goil*, which, in lat. 16° N., long. 99° W., on the 19th was experiencing calms and light airs, while a violent Tehuantepecer was blowing south of the isthmus. At Salina Cruz maximum wind velocities from the north, in miles per hour, occurred as follows: On the 3d, 64 miles; 4th and 26th, 56 miles; 29th, 60 miles, these constituting whole gales to storm winds at the head of the bay.

The prevailing wind direction at Honolulu was northeast, whereas in December it is usually east, and the maximum wind velocity was at the rate of 28 miles an hour from the northeast on the 30th.

Over the northwestern part of the ocean scattered fog showed an increase from two days of occurrence in November to five days in December. It was most widespread in area on the 9th, 10th, and 19th. Occasional fog was met with thence eastward to American waters. Along the American coast it was reported on seven days in the vicinity of Puget Sound, on 13 days outside of San Francisco Harbor, and on eight days outside of San Diego. It decreased southward, but occurred on the 11th and 12th in the Gulf of Tehuantepec. Here the American steamship *Corinto* encountered it with a west-southwesterly wind, immediately following a strong norther from west-northwest on the 11th.

TYPHOONS AND DEPRESSIONS IN NOVEMBER, 1929

By Rev. José Coronas, S. J.

Weather Bureau, Manila, P. I.

One Philippine and China Sea typhoon and one Pacific typhoon.—There were only two well-developed typhoons noticed over the Far East during the month of November, one of them having traversed the Philippines through the Visayan Islands and the Sulu Sea on the 10th and 11th.

This Philippine typhoon was probably formed on the 8th in very low latitude to the southwest of Pelew Islands near 132° longitude E. and 5° latitude N. It moved northwestward on the 8th and inclined to WNW. on the 9th, reaching the Philippines near to the north of Surigao during the night of the 9th to 10th. In the morning of the 10th it moved NNW. for a few hours, and then it took a westward direction in the afternoon of the same day. This west direction was kept until the 12th when it began to move again to WNW. in the China Sea.

While traversing the Visayan Islands, this typhoon appeared to be only a shallow depression of little importance; but it began to develop more in the Sulu Sea and became a much developed and severe typhoon in the China Sea. The steamer *Calchas* passed through its center at 3:30 p. m. of November 14 in 112° 07′ longitude E. and 13° 57′ latitude N. The barometric minimum recorded at that time was as low as 28.38 inches (720.84 mm.), the winds blowing from ENE. force 9 before the minimum and from SW. force 9 to 10 after the minimum. The captain of the steamer describes thus the passing of the center:

> In the central area, we noticed many land birds including a wild duck. The sun shone clearly for a period of about 20 minutes. The wind was light and variable, and the sea was very rough and confused (pyramidal).

The approximate positions of the center at 6 a. m. of November 8 to 15 were as follows:

November 8, 6 a. m., 132° 15′ longitude E. 5° 25′ latitude N.
November 9, 6 a. m., 129° 45′ longitude E., 7° 45′ latitude N.
November 10, 6 a. m., 124° 25′ longitude E., 10° 30′ latitude N.

November 11, 6 a. m., 121° 15′ longitude E., 11° 25′ latitude N.
November 12, 6 a. m., 118° 10′ longitude E., 11° 35′ latitude N.
November 13, 6 a. m., 115° 50′ longitude E., 12° 20′ latitude N.
November 14, 6 a. m., 113° 40′ longitude E., 13° 10′ latitude N.
November 15, 6 a. m., 110° 40′ longitude E., 14° 20′ latitude N.

The other Pacific typhoon was shown in our weather maps of the 20th as forming to the south of Guam not far from 145° longitude E. and 9° latitude N. It moved northwestward until the 23d when it recurved to NNE. to the west of the southern part of the Ladrone Islands. The steamer *Ramapo* was involved in this typhoon near to the west of the Ladrone Islands with a falling barometer and strong winds and squalls from the southeast quadrant.

The approximate positions of the center of this typhoon at 6 a. m. of November 21 to 27 were:

November 21, 6 a. m., 144° 10′ longitude E., 9° 30′ latitude N.
November 22, 6 a. m., 141° 00′ longitude E., 11° 50′ latitude N.
November 23, 6 a. m., 139° 10′ longitude E., 14° 30′ latitude N.
November 24, 6 a. m., 140° 20′ longitude E., 17° 10′ latitude N.
November 25, 6 a. m., 140° 55′ longitude E., 18° 00′ latitude N.
November 26, 6 a. m., 142° 50′ longitude E., 21° 05′ latitude N.
November 27, 6 a. m., 149° 30′ longitude E., 28° 25′ latitude N.

551.515 (961.1)

THE FIJI HURRICANE OF DECEMBER, 1929

By WILLIS E. HURD

From the 7th to the 14th of December, 1929, a hurricane raged over and in the general vicinity of the Fiji Islands. Our present knowledge of this intense storm rests largely upon the facts contained in a series of reports submitted to the Weather Bureau by Mr. J. H. Berendsen, second officer of the American steamship *Golden Rod*, en route from Sydney, New South Wales, toward the Hawaiian Islands and San Francisco, via the Fijis. In addition to his own experiences, Mr. Berendsen kindly furnished radio messages received from other vessels and from Fijian and other land stations, including copies of hurricane warnings and advices transmitted from Suva.

The only additional report of the storm received was that of the British steamship *Waitemata*, Captain Jannay, Observer McCarry, Westport, New Zealand, to Vancouver. This vessel at midnight of the 10th, while at some distance south of the cyclone center, ran into whole southeasterly gales which persisted with incessant rain until 3 p. m. of the 11th when, to use the words of the observer, "the wind shifted to NE., reaching hurricane force, the ship being hove to in lat. 21° 45′ S., long. 178° W., lowest barometer 29.26. About 2 a. m. of the 12th the wind shifted to ENE. and remained there throughout the day, the gale gradually decreasing in force."

The *Golden Rod* entered the extreme forward rim of the storm zone—which was many hundreds of miles in extent—with a southeasterly gale of force 7, near lat. 22° 23′ S., long. 172° 39′ E., on the afternoon of the 10th. Thence, though at no time close to the actual hurricane center, she had mostly rough seas and strong winds to strong or whole gales until she entered harbor on the 14th, at which time the storm had passed her and was central approximately 300 to 350 miles to the southward and was moving in the general direction of Norfolk Island.

The initial appearance of the storm, as gathered from the reports of the *Golden Rod*, seems to have been near the tenth parallel of south latitude to the southeastward of the Ellice Islands, although a radio message of Monday, December 8, leads one to the suspicion that it may have originated a few days earlier considerably to the northeastward of the Ellice Group. Quoting this message:

The *Norwich City* went on reef and broke up last week at Garden Island in Phoenix Group. Eleven persons were drowned. The steamer *Lincoln Ellsworth* has 12 survivors aboard; the rest were picked up by some British steamer.

During its early days the cyclone was evidently traveling in a southwesterly direction, and on the 9th lay north or somewhat to the northwest of the Fijis. A report from the Norwegian steamship *Tyr*, at 8 p. m. of the 9th in lat. 16° 56′ S., long. 176° 05′ E., gave a southeast wind of force 10 and an atmospheric pressure of 29.33 inches. It was apparent on this date that the storm was curving into southward, and a report from Suva showed a barometer depressed to 29.56 inches, wind ESE., force 6.

On the 10th Suva sent out a report of a pressure of 29.39 inches, wind SE. by E., force 7 to 8, rainy and squally weather. At 8 a. m. the steamship *Pinna*, anchored in Nandi Bay, outside Lautoka, Fiji, reported a barometer of 29.18, wind SSE., 8. The storm had now recurved into southeast and was headed directly upon the Fiji Group.

At noon of the 11th the hurricane center was slightly north of Suva, where the barometer read 29.22, with a fresh southeast gale, and was moving upon Savu Savu, where at 12:40 p. m. a hurricane wind from northeast was raging, with barometer at 28.48.

On the 12th the hurricane, after passing Suva to the eastward, slowly recurved from southeast into south over the Koro Sea. Fresh to strong shifting gales were yet blowing at Suva, but the winds were diminishing rapidly at Savu Savu. At least one important line of communication—the land line to Levuka—was reported interrupted.

At 8:30 p. m. of the 13th Suva reported the storm as well to the southward, now apparently heading south-southwest. The Danish motor ship *Jane Maersk*, in 23° S., 178° E., at 8 p. m., with a barometer of 29.33, rising, was experiencing a south wind of force 11, which attests to the violence of the cyclone at this time.

THREE TROPICAL CYCLONES OF THE SOUTH PACIFIC OCEAN, 1927–28

By WILLIS E. HURD

His Excellency the Governor of New Caledonia, at Noumea, in a recent communication to the Hydrographic Office, which was forwarded to the Weather Bureau, inclosed data relative to three tropical disturbances in the South Pacific Ocean which occurred during the period December, 1927, to May, 1928.

The earliest was experienced at the beginning as a fresh northeast gale, pressure 29.33 inches, at Port Vila, Elate Island, in the New Hebrides Group, on the afternoon of December 29. Fresh to strong north gales occurred during the early hours of the 30th, with barometer dropping to a minimum of 29.13. At 10 a. m. the wind went into northwest, force 10, with rising pressure, as the cyclone passed the island to the westward, and after 2 p. m. the force lessened. The storm, which was encountered with moderate severity by the steamships *Makambo* and *Cassiopec*, proceeded in a south-southeasterly direction across the Loyalty Group midway between the New Hebrides and New Caledonia, the center passing a short distance east of Noumea at 2 a. m. of the 31st. It crossed Walpole Island at 10 a. m. and continued on the southward of the Fijis during January 1.

The cyclone of February 8–9, 1928, was of considerable violence over some portions of the New Hebrides Group, in particular devastating the south end of Santo Island and the northern part of the close-lying island of Aore, where it badly damaged buildings and broke down or uprooted the palm trees. At Lunganville, on the southeast of Santo, the barometer dropped from 29.84, at 7 p. m., to 28.78 inches, at 9 p. m. of the 8th, the wind at both hours being from east-southeast. The cyclone approached from the eastward, the center crossing five islands of the group, then going in a southwesterly